WHAT IS CLAIMED IS:

1. An ion concentration sensor, for producing a signal reflective of the ion concentration within a solution, comprising:

an ion sensitive transistor comprising:

a solution input, organized for contact with said solution;

a first reference input;

a diffusion input; and

a diffusion output;

said ion sensitive transistor being connected as a pass transistor, such that said diffusion output provides an electrical signal indicating an ion concentration in said solution.

2. An ion concentration sensor according to claim 1, further comprising a threshold drop tracker connected between said diffusion input and said diffusion output, for obtaining said electrical signal as a voltage drop between said diffusion input and said diffusion output.

3. An ion concentration sensor according to claim 1, further comprising an ion concentration calculator, for calculating said ion concentration from a voltage drop between said diffusion input and said diffusion output.

4. An ion concentration sensor according to claim 1, wherein said ion is a hydrogen ion.

5. An ion concentration sensor according to claim 1, wherein said ion sensitive transistor comprises an ion sensitive field effect transistor (ISFET).

6. An ion concentration sensor according to claim 1, wherein said ion sensitive transistor comprises a p-type transistor.

7. An ion concentration sensor according to claim 1, wherein said ion sensitive transistor comprises an n-type transistor.

8. An ion concentration sensor according to claim 1, further comprising a pulse source, for applying a pulsed signal to said diffusion input.

9. An ion concentration sensor according to claim 8, wherein said pulse source comprises a square wave generator.

10. An ion concentration sensor according to claim 8, further comprising an envelope generator for providing an envelope of said electrical signal.

11. An ion concentration sensor according to claim 10, wherein said envelope generator comprises a low pass filter (LPF).

12. An ion concentration sensor according to claim 8, wherein a frequency of said pulsed signal is greater than twice a maximum frequency of a rate of change of said ion concentration.

13. An ion concentration sensor according to claim 8, further comprising a data source, for modulating said pulsed signal with digital data.

14. An ion concentration sensor according to claim 1, further comprising a digitizer, for converting said electrical signal to digital format.

15. An ion concentration sensor according to claim 8, further comprising a digitizer, for converting said electrical signal to digital format.

16. An ion concentration sensor according to claim 1, further comprising a sweep generator, for applying a sequence of positive and negative voltage sweeps to said reference input.

17. An ion concentration sensor according to claim 1, further comprising a voltage source, for applying a stable reference voltage to said reference input.

18. An ion concentration sensor according to claim 1, further comprising an error eliminator comprising:

an error detector, for providing an error signal essentially equal to a body effect of said ion sensitive transistor; and

a subtractor, for subtracting said error signal from said electrical signal.

19. An ion concentration sensor according to claim 1, wherein said error detector comprises a reference transistor having a second reference input, a second diffusion input, and a second diffusion output, said reference transistor being configured as a pass transistor and connected in parallel with said ion sensitive transistor.

20. An ion concentration sensor according to claim 19, wherein said reference transistor comprises a reference field effect transistor (REFET).

21. A dual-mode sensor, for simultaneous measurement of the intensity of a light and the concentration of an ion in a solution, comprising:

a light sensitive device, having a discharge rate indicative of said light intensity; and

an ion sensitive transistor associated with said light sensitive device, comprising:

a solution input, organized for contact with said solution;

a reference input;

a diffusion input; and

a diffusion output;

and

a sensor output, connected to said diffusion output and to an output of said light sensitive device;

said ion sensitive transistor being connected as a pass transistor, such that said sensor output provides an electrical signal indicating the intensity of a light and of an ion concentration in said solution.

22. A dual-mode sensor according to claim 21, wherein said ion sensitive transistor comprises an ISFET.

23. A dual-mode sensor according to claim 21, wherein said ion sensitive transistor comprises an n-type transistor.

24. A dual-mode sensor according to claim 21, wherein said ion sensitive transistor comprises a p-type transistor.

25. A dual-mode sensor according to claim 21, wherein said light sensitive device comprises a photodiode.

26. A dual-mode sensor according to claim 21, further comprising an amplifier associated with said sensor output, for amplifying said electrical signal.

27. A dual-mode sensor according to claim 26, further comprising a switch associated with said amplifier, for connecting and disconnecting said sensor output in accordance with a control signal.

28. A dual-mode sensor according to claim 21, further comprising a switch associated with said sensor output, for connecting and disconnecting said sensor output in accordance with a control signal.

29. A dual-mode sensor according to claim 21, further comprising an envelope generator associated with said sensor output, for providing an envelope of said electrical signal.

30. A dual-mode sensor according to claim 21, further comprising a threshold drop tracker connected between said diffusion input and said diffusion output, for obtaining said electrical signal as a voltage drop between said diffusion input and said diffusion output.

31. A dual-mode sensor according to claim 21, further comprising a slope measurer associated with said sensor output, for determining a rate of change of said electrical signal.

32. A dual-mode sensor according to claim 21, further comprising a fall detector associated with said sensor output, for determining an amplitude drop of said electrical signal over a single cycle.

33. A dual-mode sensor according to claim 21, said dual-mode sensor being for incorporation within a biomedical sensor.

34. A dual-mode sensor according to claim 33, wherein said biomedical sensor is constructed for use in a gastro-intestinal environment, for measuring X-ray intensity and pH (potential of Hydrogen) within a digestive tract.

35. A dual-mode sensor according to claim 33, wherein said biomedical sensor comprises a sperm mobility measurer, said sperm mobility measurer comprising:

an image analyzer, for analyzing a sequence of images of a sperm sample to identify sperm motion; and

a correlator associated with said image analyzer, for correlating said sperm motion with a pH measurement.

36. A dual-mode sensor according to claim 33, wherein said biomedical sensor comprises a cell identification device, for identifying cells within a sample in accordance with a fluoroscopic tag associated with said cell and the pH of said sample.

37. A test device for performing ion concentration and image analysis of a sample, comprising:

at least one dual-mode sensor, each of said dual-mode sensors comprising:

a light sensitive device, having a discharge rate indicative of said light intensity; and

an ion sensitive transistor associated with said light sensitive device, comprising:

a solution input, organized for contact with said solution;

a reference input;

a diffusion input; and

a diffusion output;

and

a sensor output, connected to said diffusion output and to an output of said light sensitive device;

said ion sensitive transistor being connected as a pass transistor, such that said sensor output provides an electrical signal indicating the intensity of a light and of an ion concentration in said solution;

an ion concentration analyzer associated with said at least one dual-mode sensor, for analyzing ion concentration data obtained from said dual-mode sensors;

an image analyzer associated with said at least on dual-mode sensor, for analyzing a optical data obtained from said dual-mode sensors; and

a correlator associated with said ion concentration analyzer and said image analyzer, for correlating said analyzed ion concentrations with said analyzed images.

38. A test device according to claim 37, comprising digital signal processing (DSP) functionality.

39. A test device according to claim 37, wherein said correlator is further operable to correlate said analyzed ion concentrations and said analyzed images with externally provided data.

40. A test device according to claim 39, wherein said externally provided data comprises optical data.

41. A sensor array, comprising:

an array of dual-mode sensors, each of said dual-mode sensors comprising:

a light sensitive device, having a discharge rate indicative of said light intensity; and

an ion sensitive transistor associated with said light sensitive device, comprising:

a solution input, organized for contact with said solution;

a reference input;

a diffusion input; and

a diffusion output;

and

a sensor output, connected to said diffusion output and to an output of said light sensitive device;

each of said ion sensitive transistors being connected as a pass transistor, such that a respective sensor output provides an electrical signal indicating the intensity of a light and of an ion concentration in said solution in the vicinity of said sensor.

42. A sensor array according to claim 41, wherein each of said dual mode sensors further comprises a respective switch, for connecting and disconnecting a respective sensor output in accordance with a control signal.

43. A sensor array according to claim 42, further comprising a switching device for controlling said switches.

44. A sensor array, comprising:

an array of ion concentration sensors, each of said ion concentration sensors comprising:

a solution input, organized for contact with said solution;

a first reference input;

a diffusion input; and

a diffusion output;

said ion sensitive transistor being connected as a pass transistor, such that said diffusion output provides an electrical signal indicating an ion concentration in said solution.

45. A method for producing a signal reflective of the ion concentration within a solution, utilizing an ion sensitive transistor having a first ion sensitive portion, a first reference input, a first diffusion input, and a first diffusion output, said method comprising:

configuring said ion sensitive transistor as a pass transistor;

applying said solution to said first ion sensitive portion; and

obtaining an electrical signal indicating an ion concentration in said solution from a voltage drop between said first diffusion input and said first diffusion output.

46. A method for producing a signal reflective of the concentration of ions within a solution according to claim 45, wherein said configuring said ion sensitive transistor comprises:

providing a reference voltage to said first reference input; and

inputting a baseline signal to said first diffusion input.

47. A method for producing a signal reflective of the concentration of ions within a solution according to claim 45, wherein said ion is a hydrogen ion.

48. A method for producing a signal reflective of the concentration of ions within a solution according to claim 45, wherein said ion sensitive transistor comprises an ISFET.

49. A method for producing a signal reflective of the concentration of ions within a solution according to claim 45, further comprising generating an envelope of a signal at said diffusion output.

50. A method for producing a signal reflective of the concentration of ions within a solution according to claim 46, wherein said baseline signal comprises a pulsed signal.

51. A method for producing a signal reflective of the concentration of ions within a solution according to claim 50, further comprising modulating said pulsed signal with digital data.

52. A method for producing a signal reflective of the concentration of ions within a solution according to claim 50, comprising setting a frequency of said pulsed signal to be greater than twice a maximum frequency of a rate of change of said ion concentration.

53. A method for producing a signal reflective of the concentration of ions within a solution according to claim 46, wherein a level of said reference voltage is essentially stable.

54. A method for producing a signal reflective of the concentration of ions within a solution according to claim 45, further comprising applying a sequence of positive and negative sweeps to said reference input.

55. A method for producing a signal reflective of the concentration of ions within a solution according to claim 46, further comprising:

configuring a reference transistor having a second reference input, a second diffusion input, and a second diffusion output as a pass transistor, in parallel with said ion sensitive transistor; and

subtracting an error signal at said second diffusion output from said electrical signal.

56. A method for producing a signal reflective of the concentration of ions within a solution according to claim 55, wherein said configuring of a reference transistor comprises:

providing said reference voltage to said second reference input; and

inputting said baseline signal to said second diffusion input.

57. A method for producing a signal simultaneously reflective of the intensity of a light and of the concentration of ions within a solution, comprising:

configuring an ion sensitive transistor, having an ion sensitive portion, a reference input, a diffusion input, and a diffusion output, as a pass transistor;

connecting said diffusion output to a light sensitive device having a discharge rate indicative of said light intensity;

applying said solution to said ion sensitive portion; and

obtaining an electrical signal indicating the intensity of a light and of an ion concentration in said solution from a voltage drop between said diffusion input and said diffusion output.

58. A method for simultaneously producing a signal reflective of the intensity of a light and of the concentration of ions within a solution according to claim 57, wherein said configuring comprises:

providing a reference voltage to said reference input; and

inputting a pulsed signal to said diffusion input.

59. A method for simultaneously producing a signal reflective of the intensity of a light and of the concentration of ions within a solution according to claim 57, wherein said ion sensitive transistor comprises an ISFET.

60. A method for simultaneously producing a signal reflective of the intensity of a light and of the concentration of ions within a solution according to claim 57, further comprising isolating a light-responsive component of said electrical signal.

61. A method for simultaneously producing a signal reflective of the intensity of a light and of the concentration of ions within a solution according to claim 57, wherein a rate of change of said output signal encodes said light intensity.

62. A method for simultaneously producing a signal reflective of the intensity of a light and of the concentration of ions within a solution according to claim 57, wherein an amplitude drop of said output signal over a single cycle encodes said light intensity.

63. A method for simultaneously producing a signal reflective of the intensity of a light and of the concentration of ions within a solution according to claim 57, wherein said light sensitive device comprises a photodiode.

64. A method for performing ion concentration and image analysis of a sample, from ion concentration and image data provided by at least one dual-mode sensor, each of said dual-mode sensors comprising:

a light sensitive device, having a discharge rate indicative of said light intensity; and

an ion sensitive transistor associated with said light sensitive device, comprising:

a solution input, organized for contact with said solution;

a reference input;

a diffusion input; and

a diffusion output;

and

a sensor output, connected to said diffusion output and to an output of said light sensitive device;

said ion sensitive transistor being connected as a pass transistor, such that said sensor output provides an electrical signal indicating the intensity of a light and of an ion concentration in said solution;

said method comprising:

analyzing said ion concentration data;

analyzing said image data; and

correlating said analyzed ion concentrations with said analyzed images.

65. A method for performing ion concentration and image analysis of a sample according to claim 64, further comprising correlating said analyzed ion concentration and image data with externally provided data.

66. A method for performing ion concentration and image analysis of a sample according to claim 65, wherein said externally provided data comprises optical data.